

ARGUS<sup>®</sup>

Cordex 48-1.2kW  
19" Front Access Shelf System  
Up to 4800W with CXCM1 and Distribution  
030-834-B2



Visit us at [www.argus.ca](http://www.argus.ca)

*Power*

This page intentionally left blank.

**Cordex 48-1.2kW  
19" Front Access Shelf System  
Up to 4800W with CXCM1 and Distribution**

030-834-B2

The following documents and drawings are included in this manual to provide the necessary information required for installation, operation and fault diagnosis of the unit:

- **Specifications, Shelf:** 030-834-B1
- **Specifications, Rectifier:** 010-619-B1
- **Specifications, CXCM1:** 018-598-B1
- **CSA/NRTL Equivalence:** 048-554-10
- **Installation and Operation Instructions:** 030-834-C0
- **Schematic:** 030-834-05
- **Outline Drawing, Shelf:** 030-834-06
- **Customer Connections:** 030-834-08
- **Warranty and Service Information:** 048-700-10
- **Service Centers:** 048-693-10

# Specifications for Argus' Cordex 48-1.2kW 19" Front Access Shelf System

## Basic Unit, Shelf

Maximum Output:	100A, 58Vdc
Recommended Feeder Breaker	
Single Phase:	120V: 15A, #14 AWG (for two rectifiers) 220/240V: 20A, #12 AWG (for two rectifiers)

## Mechanical

Dimensions:	88mm H x 439.5mm W x 305mm D (rectifier front panel 12.5mm D) [3.5" H x 17.3" W x 12" D (rectifier front panel 0.49" D)]
Mounting*:	19" or 23" rack, 6" offset (center), EIA rack spacing
Weight:	4.55 kg (10.03 lb.)

## Connections

AC Input (dual):	Dual IEC-60320-C20 MAIC connectors (for use with IEC-60320-C19 female line cords)
Chassis ground:	#10-32 stud
Communications:	CAN (bus, single in/out) RJ-12 offset (female)
Site ground:	1/4" on 5/8" centers
Battery Output:	1/4" on 5/8" centers, two (2) sets per polarity
Load Output:	AM breakers: 1/4" on 5/8" centers GMT fuses: screw terminal #16 to #26 AWG (1.5 to 0.129mm <sup>2</sup> )
Signal wiring:	Terminal blocks #16 to #26 AWG (1.5 to 0.129mm <sup>2</sup> )

## Safety

EN 60950	Rectifier output shall be rated SELV suitable for connection to TNV-1 circuits
UL	60950-1-2002
CSA	60950-1-03
CE	EN 60950, CB Scheme 73/23/EEC Low Voltage Directive with amendment 93/68/EEC
Telcordia (Bellcore)	NEBS certified Level 3 compliant (meets all the requirements of GR-63-CORE and GR-1089-CORE)

NOTE: This equipment is suitable for use in "Common Bonding Network" configuration.

\* See drawings at the rear of this manual.

*The above information is valid at the time of publication. Consult factory for up-to-date ordering information. Specifications are subject to change without notice.*

# Specifications for Argus' Switched Mode Rectifier CXRF-HP 48-1.2kW

## Power Module Output

Voltage:	42 to 58Vdc within rated limits
Power:	1200W (176 to 300Vac input) 600W minimum (110 to 130Vac input) [Subject to de-rating below 110Vac due to current limited input and when operated above temperature thresholds listed below]
Current:	22.2A @ 54Vdc, 25A maximum @ 48Vdc (176 to 300Vac input) 11.1A @ 54Vdc, 12.5A maximum @ 48Vdc (110 to 130Vac input)
Static Load Regulation:	Better than $\pm 0.5\%$ for any load change within rated limits
Static Line Regulation:	Better than $\pm 0.1\%$ for any change in input voltage within rated limits
Dynamic Line Regulation:	Better than $\pm 1\%$ for any change in input voltage within rated limits (output voltage shall recover to static limits within 2ms)
Hold-up Time:	>10ms
Time Stability:	$\leq 0.2\%$ per year
Temperature Stability:	$\leq 100\text{ppm}/^\circ\text{C}$ over the operating range
Heat Dissipation:	<308 BTU per hour (per rectifier module)
Electrical Noise:	<38dBnC (voice band) <30mVrms 10kHz to 10MHz (wideband) <150mVp-p 10kHz to 100MHz <2mV (psophometric)
Acoustic Noise:	<60dBa @ 1m (3ft.) @ 30°C (86°F)
EMI:	The unit meets requirements of EN55022: Class A for Radiated Emissions, and Class B for Conducted Emissions (see Standards for more EMC)

In accordance with FCC requirements, we provide the following statement as specified in the FCC guidelines for conformance to Part 15, Class B:

**NOTE:** *This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:*

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications to this equipment not expressly described in this manual could void the FCC compliance.

## Power Module Input

Voltage:	208/220/240Vac (continuous operation 90-300Vac) High: 277 to 300Vac (de-rated power factor) Low: 90 to 176Vac (de-rated output power)
Frequency:	50/60Hz nominal (45 to 66Hz)
Current:	7.5A maximum (176 to 300Vac) 6A maximum (90 to 176Vac)
Power Factor:	>0.99 at nominal conditions and 50-100% load
Protection:	10kA-interrupting capacity fuses in active and neutral lines
Efficiency:	>93% at nominal conditions and 50-100% load
Inrush Current:	≤ full load steady state current of the rectifier within rated limits
Start-up Ready Time:	<5 seconds (excluding soft start) to complete inrush limit routine and ac measurement (for OK signal)
Start-up Delay:	Programmable up to 120 seconds to enable stagger-start of multiple rectifiers and to minimize the effect on a supply source
Soft Start:	User adjustable to at least 5 seconds (not including start-up delay time) and is determined by output current limit ramp-up
T.H.D. (Current):	<5% at 100% load for 208 to 220Vac
Input Transient Suppression:	Meets ANSI/IEEE C62.41 Category B3
Input Leakage Current:	<3.5mA @ 265Vac 60Hz for up to two rectifiers* >5mA @ 265Vac 60Hz for three or more rectifiers* [*plugged inside 1RU or 2RU shelf] <b>See Warning note at the end of Important Safety Instructions page</b>

## Environmental

Operating Temperature:	-40 to +65°C (-40 to 149°F) -40 to +80°C (-40 to 176°F) [de-rated output power]
Storage Temperature:	-40 to +80°C (-40 to 176°F)
Humidity:	0 to 95% non-condensing
Elevation:	-500 to +2800m; to 4000m with temperature de-rated to 40°C (-1640 feet to 9186 feet; to 13124 feet with temperature de-rated to 104°F)

## Miscellaneous

MTBF:	<222,469 hours ground benign @ 25°C (77°F)
Dimensions:	44mm H x 88mm W x 318mm D [1.73" H x 3.5" W x 12.5" D]
Weight:	1.23 kg (2.72 lb.)

## Referenced Standards

EN 300 386-2:	EMC and ERM; Telecommunication Network Equipment
EN 55022 (CISPR 22):	Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement, Class A and Class B
EN 61000-3-2:	Harmonic Current Emissions
EN 61000-3-3:	Voltage Fluctuations and Flicker
EN 61000-4-2:	ESD Immunity
EN 61000-4-3:	Radiated Electromagnetic Immunity
EN 61000-4-4:	Electrical Fast Transient/Burst Immunity
EN 61000-4-5:	Power Line Surge Immunity
EN 61000-4-6:	Conducted Electromagnetic Immunity
EN 61000-4-11:	Voltage Dips, Short Interruptions and Variations
ETS 300 019-1-1:	Environmental Conditions; Storage
ETS 300 019-1-2:	Environmental Conditions; Transportation
GR-63-CORE:	Physical Protection
GR-1089-CORE:	Electromagnetic Compatibility and Electrical Safety

*The above information is valid at the time of publication. Consult factory for up-to-date ordering information. Specifications are subject to change without notice.*

# Specifications for Argus' CXCM1 Cordex Controller

## Basic Unit, CXCM1

Input Voltage:	17 to 65Vdc within rated limits
Current:	<100mA @ 48Vdc <200mA @ 24Vdc
MTBF:	472,000 hours @ 25°C (77°F)
Safety:	CSA 60950-1-03 IEC/EN 60950-1 CE Mark
EMC:	The unit meets requirements of: EN 300 386-2 EMC and EMR, Telecommunications Network Equipment Emissions: EN 55022 Class A (CISPR 22) CFR47 (FCC) Part 15 Class A Immunity: EN 61000-4-2 ESD EN 61000-4-3 Radiated EN 61000-4-4 EFT /Burst EN 61000-4-6 Conducted Environmental: ETS 300 019-1-1 Environmental Conditions, Storage ETS 300 019-1-2 Environmental Conditions, Transportation NEBS: GR-63-CORE Physical Protection GR-1089-CORE Electromagnetic Compatibility and Electrical Safety

In accordance with FCC requirements, we provide the following statement as specified in the FCC guidelines for conformance to Part 15, Class A:

**NOTE:** *This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*

Any changes or modifications to this equipment not expressly described in this manual could void the FCC compliance.

## Environmental

Temperature:	-40 to 75°C (-40 to 167°F) operating -40 to 80°C (-40 to 176°F) storage
Humidity:	0 to 95% non-condensing
Elevation:	-500 to +4000m (-1640 to 13124 ft)

## Hardware Specifications, CXCM1

CPU:	Coldfire
RAM:	8MB
Flash:	4MB standard
Display:	4 digit LCD
Front Panel Controls:	Display pushbutton toggle switch for voltage (V) or current (A) Reset switch (soft reset button; hold for 3 seconds to reset IP)
LED's:	System OK (Green) Power System Minor Alarm (Yellow) Power System Major Alarm / Controller Fail (Red)
Audio:	Built-in speaker for alarm and popup message tones
Dimensions:	44mm H x 88mm W x 318mm D [1.73" H x 3.5" W x 12.5" D]
Weight:	0.62 kg (1.36 lb.)
Mounting:	Modular on Cordex CXRF 48-1.2kW series shelves [options for 1RU horizontal or 2RU vertical orientation depending on shelf]
Relay Outputs:	Four (4) Form C, 60Vdc 1A maximum
Digital Inputs:	Two (2), 0 to 60Vdc
Analog Inputs:	One (1) DC voltage, 0 to 60Vdc One (1) DC current, $\pm 50\text{mV}$ Two (2) temperature, 0 to 20Vdc with power source
Communication Ports:	Ethernet RJ-45, Argus Modem DB-9, CAN [see shelf specifications]

## Recommended Signal Wire Sizes (as per UL/CSA)

Wire Size Range:	#16 to #26 AWG) (1.5 to 0.14mm <sup>2</sup> )
Temperature Range:	0 to 50°C (32 to 122°F)

**CAUTION – TO REDUCE RISK OF FIRE, USE ONLY #26 AWG (0.14mm<sup>2</sup>) OR LARGER WIRE.**

*The above information is valid at the time of publication. Consult factory for up-to-date ordering information. Specifications are subject to change without notice.*

# CSA/NRTL — MARKS — BACKGROUND

## What are the CSA and NRTL?

CSA (Canadian Standards Association also known as CSA International) was established in 1919 as an independent testing laboratory in Canada. CSA received its recognition as an NRTL (Nationally Recognized Testing Laboratory) in 1992 from OSHA (Occupational Safety and Health Administration) in the United States of America (Docket No. NRTL-2-92). This was expanded and renewed in 1997, 1999, and 2001. The specific notifications were posted on OSHA's official website as follows:

- Federal Register #: 59:40602 - 40609 [08/09/1994]
- Federal Register #: 64:60240 - 60241 [11/04/1999]
- Federal Register #: 66:35271 - 35278 [07/03/2001]

When these marks appear with the indicator "C and US" or "NRTL/C" it means that the product is certified for both the US and Canadian markets, to the applicable US and Canadian standards. (1)

Argus rectifier and power system products, bearing the aforementioned CSA marks, are certified to CSA C22.2 No. 950 and UL 1950, or CSA/UL 60950.

As part of the reciprocal, US/Canada agreement regarding testing laboratories, the Standards Council of Canada (Canada's national accreditation body) granted Underwriters Laboratories (UL) authority to certify products for sale in Canada. (2)

Only Underwriters Laboratories may grant a licence for the use of this mark, which indicates compliance with both Canadian and US requirements. (3)

## What are NRTLs and what do they do?

NRTLs are third party organizations recognized by OSHA, US Department of Labor, under the NRTL program.

The testing and certifications are based on product safety standards developed by US based standards developing organizations and are often issued by the American National Standards Institute (ANSI). (4)

The NRTL determines that a product meets the requirements of an appropriate consensus-based product safety standard either by successfully testing the product itself, or by verifying that a contract laboratory has done so, and the NRTL certifies that the product meets the requirements of the product safety standard. (4)

## When was the NRTL started and who governs it?

In 1983, in a suit brought on by an independent testing laboratory, OSHA was court ordered to remove specific references to UL (Underwriters Laboratories) and FMRC (Factory Mutual Research Corporation) from its regulations.

In 1988, OSHA revised its regulations to remove those references and the NRTL program was established.

The NRTL Program is both national and international in scope with foreign labs permitted.

### References:

Information in this document has been developed from the official websites of the respective organizations.

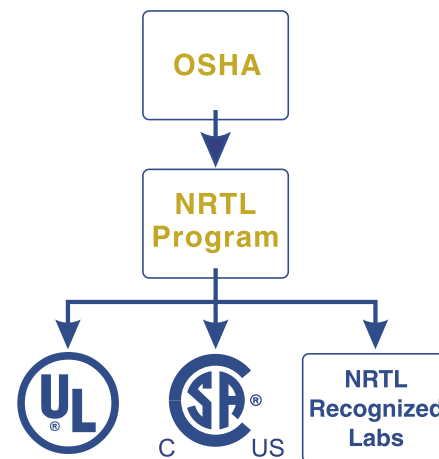
- (1) [www.csa-international.org](http://www.csa-international.org)
- (2) [www.scc.ca](http://www.scc.ca)
- (3) [www.ulc.ca](http://www.ulc.ca)
- (4) [www.osha.gov](http://www.osha.gov)



The product on which either of these marks appear has been certified by CSA as meeting applicable Canada/US standards.


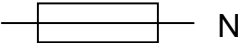


The product on which this mark appears has been certified by UL as meeting applicable Canada/US standards.



# IMPORTANT SAFETY INSTRUCTIONS

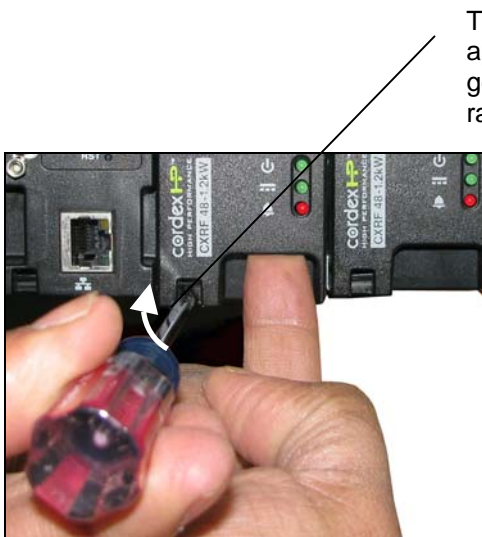
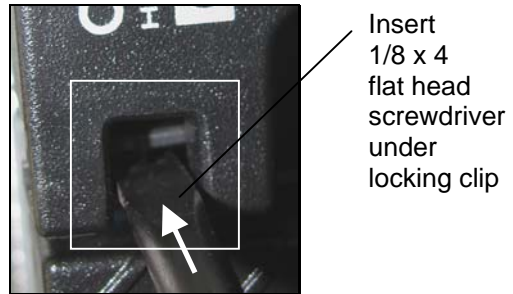
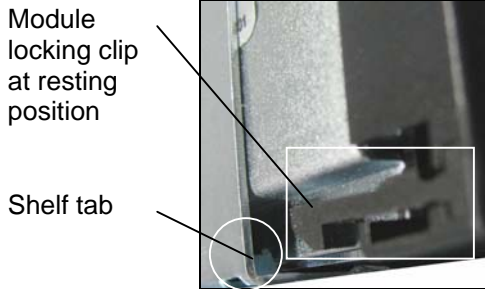
## SAVE THESE INSTRUCTIONS

1. Please read this manual prior to use to become familiar with the product's numerous features and operating procedures. To obtain a maximum degree of safety, follow the sequences as outlined.
2. This manual provides warnings and special notes for the user:
  - a. Points that are vital to the proper operation of the product or the safety of the operator are indicated by the heading: **WARNING**.
  - b. A notation that is in ***Bold Italic*** typeface covers points that are important to the performance or ease of use of the product.
3. Before using the product, read all instructions and cautionary markings on the product and any equipment connected to the product.
4. Do not expose the product to rain or snow; install only in a clean, dry environment.
5. **CAUTION** – Unless otherwise noted, use of an attachment not recommended or sold by the product manufacturer may result in a risk of fire, electric shock, or injury to persons.
6. **CAUTION** – Do not operate the product if it has received a sharp blow, it has been dropped, or otherwise damaged in any way – return it to a qualified service center for repair.
7. **CAUTION** – Do not disassemble the product – call our qualified service centers for servicing. Incorrect reassembling may result in a risk of electrical shock or fire.
8. **CAUTION** – Double pole / Neutral fusing.   N
9. **WARNING** – High leakage current – Earth connection essential before connecting supply.

## MANUAL ADDENDUM

Unit Description: CXRF 48-1.2kW 19" Front Access Shelf System  
 Manual P/N: 030-834-B2 Applies to Manual Revision: A

#	Date	Page#	Line#	Correction to be implemented
1	09-10-26	4 of 030-834-C0	12	Revise text: A <b>1/8 x 4</b> flat head screwdriver is used to <b>lift and release</b> the clip from the locked position.
2		11	29	Revise text: Apply pressure on the front of the <b>module</b> to engage...
3		11	33	Revise text: To remove a module, insert a <b>1/8 x 4</b> flat head screwdriver into the slot located on the bottom left <b>corner</b> of the <b>front plastic panel</b> . With one hand, turn the screwdriver <b>clockwise approximately 30 degrees to move</b> the clip from the <b>resting state (locked position)</b> . With the other hand, <b>grasp the ledge of the finger opening on the front panel</b> to pull the module away from the rear connector and out of the shelf. CXRF and CXCM1 removal shown below.
4		11	36	Insert figures showing module locking clip and shelf tab to aid in the module insertion/removal procedure:



CXRF removal



CXCM1 removal

## MANUAL ADDENDUM

# TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Scope of the Manual .....	1
1.2	Product Overview .....	1
1.3	Part Numbers and List Options .....	2
<b>2</b>	<b>FEATURES .....</b>	<b>3</b>
2.1	NEW! Rectifier High Performance (HP) Design .....	3
2.2	Rectifier Front Panel .....	3
2.3	True Module Fail Alarm .....	4
2.4	Heat Dissipation .....	4
2.5	Over Temperature Protection .....	4
2.6	Wide AC Range .....	4
2.7	AC Inrush/Transient Suppression .....	5
2.8	Soft Start .....	5
2.9	Start Delay .....	5
2.10	Current Limit/Short Circuit Protection .....	5
2.11	Power Limiting .....	5
2.12	High Voltage Shutdown (HVSD) .....	5
2.13	Battery Eliminator Operation .....	5
2.14	Front Access Shelf .....	6
2.15	Cordex Modular System Controller (CXCM1) .....	7
2.16	System Controller Front Panel .....	7
2.17	Analog Input Channels .....	8
2.18	Digital Input Channels .....	9
2.19	Alarm and Control Output Relays .....	9
2.20	Network Connection and Remote Communications .....	9
<b>3</b>	<b>INSPECTION .....</b>	<b>10</b>
3.1	Packing Materials .....	10
3.2	Check for Damage .....	10
<b>4</b>	<b>INSTALLATION .....</b>	<b>11</b>
4.1	Safety Precautions .....	11
4.2	Shelf Preparation/Mounting .....	11
4.3	Module Insertion/Removal .....	11
<b>5</b>	<b>WIRING AND CONNECTIONS .....</b>	<b>12</b>
5.1	Safety Precautions .....	12
5.2	Tools Required .....	12
5.3	AC Feeder Protection/Sizing .....	12
5.4	AC Input .....	12
5.5	Calculating Output Wire Size Requirements .....	13
5.6	DC Output .....	13
5.7	CAN Out Port .....	15
5.8	Network Connection and Remote Communications via CXCM1 .....	15
5.9	Signal Wiring Connections .....	16
<b>6</b>	<b>OPERATION .....</b>	<b>19</b>
6.1	Main Rectifier States .....	19
6.2	Main Rectifier Modes .....	20

6.3	Can Bus Communications.....	20
6.4	Factory Ranges and Defaults .....	21
<b>7</b>	<b>SYSTEM STARTUP .....</b>	<b>22</b>
7.1	Check System Connections.....	22
7.2	Verify AC and Power the Shelf .....	22
7.3	Check Battery Polarity and Connect.....	22
7.4	CXC Reset .....	22
<b>8</b>	<b>MAINTENANCE .....</b>	<b>23</b>
8.1	Fan Replacement.....	23
<b>9</b>	<b>ARGUS CONVENTIONS.....</b>	<b>24</b>
9.1	Numbering System.....	24
9.2	Acronyms and Definitions .....	24

# 1 Introduction

## 1.1 Scope of the Manual

This instruction manual explains the installation, interconnection, and operation of Argus Technologies' Cordex CXRF-HP 48-1.2kW integrated 2RU shelf system with up to 4800W output power and front access connections/distribution.

**NOTE:** *To aid the user with installation, frequent reference is made to drawings located at the rear of the manual.*

## 1.2 Product Overview

Designed specifically for restricted space installations, this 48Vdc power and distribution system incorporates the "HP" (high performance) series of 48V 1.2kW Cordex rectifier modules and a complete front access design, allowing for all customer connections in front of the rack channel. The standard power system accommodates up to four rectifiers, a Cordex modular system controller (CXCM1), with breaker and GMT fuse distribution in a compact 2RU package.

Cordex rectifier modules use a high frequency, switched mode conversion technique to provide a fully regulated and isolated DC output from the AC mains. The Cordex CXRF-HP 48-1.2kW rectifier model input is universal to allow use on 120/208/220/240Vac 50/60Hz electrical service.

Rectifier power modules are "hot swappable" meaning they can be inserted or removed from the shelf without cutting power to or from the system or the load.

Additional power modules can be included with the system at the time of ordering or added after the shelf has been installed.

The equipment is suitable for installation in Network Telecommunication Facilities.

The shelf is designed for horizontal mounting in a 19" or 23" center mount installation via universal mounting brackets (EIA rack spacing) and utilizes dual IEC-type connectors for multiple AC line cord solutions.

The Argus Cordex CXCM1 was designed as a modular CXC controller for the Cordex CXRF-HP 48-1.2kW rectifier series.

***Details for installation and wiring are provided in the respective chapters of this documentation package.***

All models of the CXC allow the user to set up, control and monitor the entire power system and ancillary components from one central, easy-to-use source: your web browser. The CXCM1 model does not have a touch screen display; therefore, system setup and management is performed exclusively with the web interface.

***Details of controller operation are provided in the current version software manual.***

The distribution component utilizes up to four bullet-type breakers and up to ten GMT fuse positions. The distribution module also allows for termination of two battery strings and includes a 125A battery shunt.



**Figure 1—Cordex CXRF-HP 48-1.2kW 19" 2 RU shelf system with front-access connections**

### 1.3 Part Numbers and List Options

This product is available to order under the following part numbers and list options:

Description	Part Number/List Option
Cordex CXRF-HP 48-1.2kW center mounting 2RU shelf for systems up to 4800W	030-834-20
[equipped to receive one CXCM1 controller and up to four CXRF-HP 48-1.2kW rectifiers]	*List 0
48Vdc output	*List 2
19" center (mid) mount	*List 19
23" center (mid) mount	List 23
Circuit breaker distribution, bullet-type, four load circuit breakers, two battery connections, ten GMT fuse positions, 125A battery shunt	*List 80
Battery LVD (LVBD), 100A	List 87
Two universal AC line cords, C19R – flying leads, 3.5m each	List 88
Two 120Vac line cords, L5-15P plugs, 2.5m each	List 89
Blank panel (for power module slot)	List 90
CXCM1 controller	List 99
CXCM1 controller	018-598-20
Basic module	*List 0
Horizontal mount (1RU high, not available with this shelf 030-834-20)	List 90
Vertical mount (2RU high)	*List 91
Cordex CXRF-HP 48-1.2kW rectifier power module, 120Vac-208-240Vac universal input	010-619-20
Basic module [front panel material complies with GR-63 flame spread test]	*List 0
Two universal AC line cords, C19R – flying leads, 3.5m each (same as List 88)	877-671-19
Two 120Vac line cords, L5-15P plugs, 2.5m each (same as List 89)	877-690-19
Blank panel (for power module slot)(same as List 90)	747-622-20-000
Breaker, AM-type mid-trip plug-in, 1A	470-300-10
Breaker, AM-type mid-trip plug-in, 3A	470-301-10
Breaker, AM-type mid-trip plug-in, 5A	470-302-10
Breaker, AM-type mid-trip plug-in, 10A	470-303-10
Breaker, AM-type mid-trip plug-in, 15A	470-304-10
Breaker, AM-type mid-trip plug-in, 20A	470-305-10
Breaker, AM-type mid-trip plug-in, 25A	470-306-10
Breaker, AM-type mid-trip plug-in, 30A	470-307-10
Breaker, AM-type mid-trip plug-in, 35A	470-308-10
Breaker, AM-type mid-trip plug-in, 40A	470-309-10
Breaker, AM-type mid-trip plug-in, 45A	470-310-10
Breaker, AM-type mid-trip plug-in, 50A	470-311-10
Breaker, AM-type mid-trip plug-in, 60A	470-312-10
Breaker, AM-type mid-trip plug-in, 70A	470-313-10
Breaker, AM-type mid-trip plug-in, 80A	470-314-10
Breaker, AM-type mid-trip plug-in, 90A	470-315-10
Breaker, AM-type mid-trip plug-in, 100A	470-316-10
GMT fuse, 0.5A	460-004-10
GMT fuse, 1A	460-006-10
GMT fuse, 1.3A	460-081-10
GMT fuse, 1.5A	460-082-10
GMT fuse, 2A	460-083-10
GMT fuse, 3A	460-013-10
GMT fuse, 4A	460-085-10
GMT fuse, 5A	460-084-10
GMT fuse, 7.5A	460-105-10
GMT fuse, 10A	460-069-10
GMT fuse, 15A	460-150-10

\* Default option

*The above information is valid at the time of publication. Consult factory for up-to-date ordering information.*

## 2 Features

### 2.1 NEW! Rectifier High Performance (HP) Design

The Cordex CXRF-HP series of 48V 1.2kW rectifier modules employ an advanced resonant power conversion technology featuring high power conversion efficiency. All internal semiconductor devices operate under “soft-switching” conditions and exhibit very low power loss. The reduced power loss leads to lower thermal stress on the semiconductors and thus improves reliability.

Sustaining low component temperatures is again the primary factor with meeting the three worst-case field scenarios: 65 deg. C ambient temperatures, full output power, and low AC input (176Vac). While meeting these specifications, Cordex rectifiers also offer roughly twice the reliability at 55 deg. C and up to four times more at 45 deg. C ambient temperature.

### 2.2 Rectifier Front Panel



Figure 2–Cordex CXRF-HP 48-1.2kW rectifier front panel

#### 2.2.1 LEDs

The front panel LEDs provide rectifier status summary and help to locate a specific module under CXC control.

##### 2.2.1.1 AC

The top LED (green) is on when AC is within valid range and the rectifier is delivering power to the load. The LED will flash (~2Hz) when AC is outside the nominal range – **AC voltage is invalid if the AC Mains Low or AC Mains High alarm is active**. The LED turns off when AC has failed (or no AC power is present).

##### 2.2.1.2 DC

The middle LED (green) is on when the rectifier is delivering power to the load. The LED will flash when communication is lost. The LED turns off when the rectifier is off; e.g., when commanded via the CXC.

##### 2.2.1.3 Alarm

The bottom LED (red) is on continuously in the event of an active Module Fail alarm. The LED will flash (~2Hz) when a minor alarm is detected. The LED remains off in the absence of an alarm. If the unit output is not connected to a battery or parallel rectifier, the LED will extinguish if no AC power is present.

#### 2.2.1.4 LED Activity During 'Locate Module' Command from CXC

When the 'locate module' command has been received from the CXC, the LEDs will behave in a distinctly different way so that the rectifier is easier to visually identify among adjacent rectifiers.

This state is entered when commanded via the CXC. The LEDs will flash in a distinct pattern repeating every 2 seconds.

#### 2.2.1.5 LED Activity During Firmware Upload

When a rectifier firmware upload is in progress, the LEDs will behave in the same way as the 'locate module' command described above.

### 2.2.2 Mechanical

A locking clip is provided to secure the rectifier into the shelf. During normal operation the rectifier shall be locked into position. A handle (or grip) is incorporated into the front panel to facilitate the removal of the rectifier from the shelf. A small flat head screwdriver is used to turn a lever that lifts the clip from the locked position.

### 2.3 True Module Fail Alarm

The power modules have a "true" fail alarm. This provides a true indication of the power module's ability to source current. When the module's output current drops below 2.5% of the rated output a low output current condition is detected and the Module Fail detection circuit is activated. This circuit momentarily ramps up the output voltage to determine if the module will source current. If no increase in current is detected, the Module Fail alarm is activated. The module will test once every 60 seconds for the condition until current is detected. Output voltage ramping will cease upon detection of current<sup>1</sup>. A minimum 2.5% load is required to avoid the Ramp Test Fail alarm; this can typically be provided with the parallel system battery. Activation of this alarm could indicate a failed module or a failed load.

**NOTE:** *For Cordex rectifier systems without batteries (or with a very light load; below 2.5% of rated output) it is recommended that the ramp test be disabled to avoid nuisance alarms. The Ramp Test feature is enabled/disabled via the CXC menu item: Rectifiers, Configure Settings.*

### 2.4 Heat Dissipation

Cooling of the module is front-to-rear with the exhaust air exiting at the back. The fan is variable speed; which is determined by heatsink temperature and load.

### 2.5 Over Temperature Protection

Each rectifier module is protected in the event of an excessive increase in temperature due to component failure or cooling airflow blockage. During over temperature conditions, the rectifier limits the output power as well as the output current. If temperature continues to increase, a shutdown of the rectifier is initiated. The rectifier shall restart automatically if the temperature has returned to a safe level.

### 2.6 Wide AC Range

A minor alarm is generated when the AC input voltage drops below specification.

Output power is reduced linearly between 176Vac and 132Vac to 60% of the rated output power.

Input current is limited to less than 6A for operation from 132Vac to 90Vac. Power is derated linearly between 132Vac (~700W) to 90Vac (~475W).

At a lower voltage the module will shut down and will not restart until the AC is greater than 90Vac.

For voltages above 277Vac, power factor and total harmonic distortion may be derated. Up to 320Vac, the rectifier may not be operational but shall not suffer any damage.

---

<sup>1</sup> Under normal conditions, a battery connected to the output of the rectifier will draw current when the voltage ramp occurs. Therefore the rectifier fail alarm will not be generated with a battery connected.

## 2.7 AC Inrush/Transient Suppression

The inrush current of the rectifier module is limited to the full load steady state line current to prevent surge on the AC line. Modules are also protected from input lightning and transient surges in accordance with IEEE/ANSI C62.41 Category B3.

## 2.8 Soft Start

To eliminate an instantaneous demand on the AC source, a soft start feature is employed. Soft Start, sometimes referred to as “current walk-in”, works by gradually (up to five seconds) ramping the current limit up from zero to the actual or defined customer setting. The rectifier output voltage is ramped up from the minimum voltage to the float voltage.

## 2.9 Start Delay

The rectifier modules are equipped with a delay timer in order to stagger start a series of modules to prevent excessive loading of generators upon start up. The built-in timer delays the turn on of the module depending on the value selected (up to 120 seconds) via the CXC. A minimum one-second delay is preset to allow charging of the input capacitors.

## 2.10 Current Limit/Short Circuit Protection

The current limit function determines the maximum output current limit of the rectifier module, regardless of output voltage or power. Maximum output current is limited to a constant value down to short circuit condition. Current limiting can be used to mate the rectifier output current ampacity to the needs of the load and parallel battery to minimize excessive battery recharge current.

The rectifier will sustain a short circuit at the output terminals indefinitely. The maximum short circuit current shall not exceed 105% of the rated full load current.

## 2.11 Power Limiting

Each rectifier module is designed to limit power output to the module specification. This enables more current to be supplied at lower output voltages, and allows matching of output to the demand of constant power loads, normally seen with telecom equipment.

This feature may also be used for a faster recharge of flooded batteries paralleled with the load.

**NOTE:** *Current limiting overrides the power-limiting feature.*

## 2.12 High Voltage Shutdown (HVSD)

This feature provides protection to the load from over voltage conditions originating from the rectifiers. It operates by shutting down the offending rectifier module when a high output voltage condition occurs. Indication is through the red Alarm (Module Fail) LED. Modules will restart automatically; however, if more than three over voltage conditions occur in one minute, the module will latch off and remain shut down until it is reset.

## 2.13 Battery Eliminator Operation

Rectifier modules maintain all specifications (except where indicated) with or without a battery attached in parallel to the output; however, if a battery or another module supplying DC voltage in parallel is not present, there will be no monitoring or control activity if there is an AC power failure or input fuse failure.

## 2.14 Front Access Shelf

The power and distribution shelf has been designed to allow for all operation and customer connections to be performed in front of the rack channel.

### 2.14.1 AC Input

The left side of the shelf system contains dual male IEC-60320-C20 ISA line cord connection points for pluggable line cords with C19R female receptacles.



Figure 3–Cordex 48-1.2kW (4800W system) AC input, CAN, and signal connections

### 2.14.2 CXCM1 Connections

Next to the CXCM1, on the left side of the shelf, are terminal block connections for the system control I/O; such as, digital signals, analog inputs, and alarm relay outputs.

### 2.14.3 Distribution Module

The shelf incorporates a distribution module for DC breaker/fuse output as well as battery connections. The module includes support for up to four AM plug-in breakers and ten GMT fuse positions. Two battery-landing positions, a 125A battery shunt, and a site ground are also provided.

It may also incorporate an LVBD.

This module contains a unique sliding connection point system to allow for the several dual-hole lug terminations in a compact space. See *Wiring and Connections* chapter of this manual for more details.



Figure 4–Cordex 48-1.2kW (4800W system) showing breakers and fuses

## 2.15 Cordex Modular System Controller (CXCM1)

The Cordex CXCM1 modular system controller is mounted in the rectifier system shelf and brings advanced monitoring technology to the Cordex CXRF-HP 48-1.2kW series of rectifiers. This compact system controller is designed for seamless operation and set up of Argus power systems and is equipped with the complete range of Cordex software features, including the following:

- Designed to communicate directly with Cordex rectifiers
- Includes battery temperature compensation charging
- Battery performance diagnostics
- Provides local and remote communications
- User definable alarms
- Daily logging of power system events and system statistics.

Behind the CXCM1's front panel lies the main controller motherboard, which contains a microprocessor, memory, as well as numerous other electronic components.

The CXCM1 includes a web server providing easy set up and monitoring using an Internet connection with the standard Windows Internet Explorer browser.

The data-logging feature allows the user to capture data from multiple inputs, for AC/DC voltages, load/battery current, cell voltages & temperatures (automatically for up to 16 user defined logs). Typical applications of the CXCM1 logging include power system details, thermal performance of outdoor enclosures, battery cell specifics, or mains variations captured by an AC voltage watchdog.

A built-in audio speaker sounds an intermittent tone during active alarms.

The input/output (I/O) board houses a series of terminal connections.

**NOTE:** *Customer settings for the CXCM1 will be provided separately in the system documentation package.*

## 2.16 System Controller Front Panel

The CXCM1 has a 4-digit display for monitoring system voltage (V) and current (A). A pushbutton toggle switch allows the user to alternate the display reading.



Figure 5–Cordex CXCM1 model system controller front panel

Details of controller operation are provided in the current version software manual.

## 2.16.1 LEDs

The CXC has three LEDs located on the front panel. These are used to display the alarm status of the power system, CXC progress and status during startup, file transfers and lamp tests.

### 2.16.1.1 Alarm Conditions

The CXC illuminates the LED that corresponds to the system alarm status. The following show the corresponding alarm status for each LED color:

**Green** – OK, no alarms present

**Yellow** – Minor alarm is present (no major alarms)

**Red** – Major alarm is present.

Only one LED is illuminated at a time during alarm conditions.

### 2.16.1.2 Progress and Status Indication

The LEDs are also used in the following situations:

**Base unit validation** – all three LEDs are on at the same time.

**File transfer** – when recovering from invalid firmware application – the red LED is illuminated.

**Lamp Test** – all three LEDs flash on and off at the same time for 2 seconds.

## 2.16.2 Reset

**NOTE:** *Refer also to the software manual – always select the Reset menu item before pressing the reset button.*

See Section 7.4 for more information on CXC Reset functions.

## 2.16.3 Modem Port

The Modem port is designed for CXCM1 connection to Argus Technologies' Cordex DC Modem #018-585-20.

### CAUTION

**Do not connect anything other than the Argus modem and Argus-supplied DB-9 cable to the D-sub port on the front of the CXCM1.**

## 2.16.4 Ethernet Port

The Ethernet port is designed for CXC connection to a user supplied network (TCP/IP secured by user) via a front panel RJ-45 jack and a standard network cable.

Local access (e.g. laptop computer) is also possible from the Ethernet port connection using a standard network crossover cable.

## 2.17 Analog Input Channels

### 2.17.1 Voltage Inputs

Two voltage input channels, V1 and V2, provide monitoring of discharge and charge voltage. The CXC software is pre-configured to monitor V1 for load voltage and V2 for battery voltage. V2 (wired internally) is used as the system reference for rectifier float voltage, low voltage disconnect (LVD), system high voltage alarm, and system low voltage alarm.

### 2.17.2 Current Inputs

The CXC software is pre-configured to monitor I1 for load current wired internally to the system current shunt.

### 2.17.3 Temperature Inputs

Two temperature input channels, T1 and T2, provide monitoring of battery temperature and temperature compensation (temp comp) or room/ambient temperature. A voltage is supplied to these terminals to power the temperature sensors.

## **2.18 Digital Input Channels**

The CXCM1 can accommodate up to two (2) channels and can monitor digital alarm/control signals from rectifiers, converters and many other types of equipment. See Section 5.9.2.

## **2.19 Alarm and Control Output Relays**

The CXCM1 contains four (4) Form C digital alarm output relays to extend alarms and control external apparatus. Each internally generated alarm or control signal may be mapped to any one of the relays, or, several signals may be mapped to just one relay or none at all. See Section 5.9.3.

## **2.20 Network Connection and Remote Communications**

The Cordex system can be set up, monitored and tested via ETHERNET 10/100 Base-T serial data connection. The communication protocol supports a web interface. All alarming and control of Cordex rectifiers is accomplished with a CXC via a CAN bus.

A step-by-step connection wizard – provided to establish remote communications with your CXC – is available via the Argus website ([www.argusdcpower.com](http://www.argusdcpower.com)).

## 3 Inspection

### 3.1 Packing Materials

All Argus products are shipped in rugged, double walled boxes and suspended via solid inserts to minimize shock that may occur during transportation. Packaging assemblies and methods are tested to International Safe Transit Association standards.

Products are also packaged with Cortex. This plastic wrap contains a corrosive-inhibitor that protects the product from corrosion for up to two years.

#### 3.1.1 Returns for Service

Save the original shipping container. If the product needs to be returned for service, it should be packaged in its original shipping container. If the original container is unavailable, make sure the product is packed with at least three inches of shock-absorbing material to prevent shipping damage.

**NOTE:** *Argus Technologies is not responsible for damage caused by the improper packaging of returned products.*

### 3.2 Check for Damage

Prior to unpacking the product, note any damage to the shipping container. Unpack the product and inspect the exterior for damage. If any damage is observed contact the carrier immediately.

Continue the inspection for any internal damage. In the unlikely event of internal damage, please inform the carrier and contact Argus Technologies for advice on the impact of any damage.



**Verify that you have all the necessary parts per your order for proper assembly.**

## 4 Installation

This chapter is provided for qualified personnel to install the product, which shall be mounted horizontally in a clean and dry environment.

**NOTE:** *To aid the user with installation, frequent reference is made to drawings located at the rear of the manual.*

This system is designed to be installed in a restricted access location inaccessible to the general public.

### 4.1 Safety Precautions



#### **WARNING**

**Hazardous voltages are present at the input of power systems. The DC output from the rectifiers and battery system, though not dangerous in voltage, has a high short circuit current capacity that may cause severe burns and electrical arcing.**

Before working with any live battery or power system/distribution center, follow these precautions:

- Remove all metallic jewelry; e.g., watches, rings, metal rimmed glasses, necklaces.
- Wear safety glasses with side shields (and prescription lenses if necessary) at all times during installation.
- Use OSHA approved insulated hand tools.

The installer should follow all applicable local rules and regulations for electrical and battery installations; e.g., CSA, UL, CEC, NEC, OSHA, and local fire codes.

### 4.2 Shelf Preparation/Mounting

The shelf has been designed for center mounting in a 19" or 23" rack. See drawing 030-834-06.

**NOTE:** *The shelf shall be mounted horizontally in a clean and dry environment. Allow at least 1.75" of free space above and below the unit for unrestricted cooling airflow. 3.5" (2RU) is recommended.*

Mounting brackets accommodate either 1" or 1-3/4" rack spacing. The shelf should be mounted to the rack using at least two #12 – 24 x 1/2" screws in each bracket. Philips-type screws and screwdriver should be used to eliminate the possibility of slippage and scratching of the unit's exterior.

An electrical conducting path shall exist between a unit's chassis and the metalwork of the enclosure in which it is mounted or a grounding conductor. Electrical continuity shall be provided by the use of thread-forming type unit mounting screws that remove any paint or nonconductive coatings and establish metal-to-metal contact.

### 4.3 Module Insertion/Removal

Insert by placing the module on the shelf bottom and sliding the module into the rear connector (inside of the shelf). Apply pressure on the front of the faceplate to engage the rear connector in the shelf receptacle. A locking clip is provided to secure the rectifier into the shelf.

**NOTE:** *Do not force a module into position if it does not seat properly. All modules are keyed to ensure that the correct module (polarity/voltage) type is used.*

To remove a module, insert a small flat head screwdriver into the slot located on the bottom left front of the faceplate. With one hand, turn the screwdriver to lift the lever that releases the clip from the locked position. With the other hand, grasp the top and bottom of faceplate to pull the module away from the rear connector and out of the shelf.

## 5 Wiring and Connections

This chapter provides cabling details and notes on cable sizing for DC applications with respect to the shelf.

**NOTE:** Refer also to foldout drawings located at the rear of the manual.

### 5.1 Safety Precautions



#### WARNING

**Hazardous AC voltages may be present. Ensure power at the AC service panel is off before attempting work on the AC connections. Use a voltmeter to verify the absence of voltage. Clearly mark the correct polarity of the battery leads before commencing work on DC connections.**

Refer to the previous (Installation) chapter for additional safety precautions.

### 5.2 Tools Required

Various tools are essential for product installation. Use this list as a guide:

- Slot head screwdrivers (blade sizes: 1/4", 1/8", 1/16")
- Philips head screwdriver, #2 (tip size 3/16")
- Digital voltmeter equipped with test leads
- Adjustable 24/48Vdc load (optional)
- Cutters and wire strippers
- Crimping tool (optional for large gauge wire)
- Socket and ratchet set (Imperial measure)
- Anti-static wrist strap
- Computer (laptop) with Microsoft® Internet Explorer 7 or greater
- Crossover cable RJ-45 (for access using the Ethernet port).

### 5.3 AC Feeder Protection/Sizing

To maximize system reliability, the AC feed divides the rectifiers into two groups to be supplied by two separate feeds. See customer connections drawing (modules are numbered left to right). TBA-1 feeds modules 1 and 2. TBA-2 feeds modules 3 and 4.

It is recommended for each feed to use a dedicated protection feeder breaker located at the AC distribution panel. The feeder breaker can also act as the disconnect device for the connected modules.

AC Input (Vac)	Number of Rectifiers on AC Feed	Circuit Breaker Exact Value to Use (A)
120	2	15
220/240	2	20

**Table A—Recommended AC supply configuration**

### 5.4 AC Input

**CAUTION: AC input wires should be routed in flexible or rigid conduit as far away as possible from the DC power wires to minimize EMI disturbances.**

Refer to Figure 3 and customer connections drawing 030-834-08.

**NOTE:** The shelf incorporates IEC plug connections requiring line cords with C19R type receptacles. See ordering information for available cords.

## 5.5 Calculating Output Wire Size Requirements

Wire size is calculated by first determining the appropriate maximum voltage drop requirement. Using the formula below calculate the CMA wire size requirement. Determine the size and number of conductors required to satisfy the CMA requirement.

$CMA = (A \times LF \times K) / AVD$ , where:

CMA = Cross section of wire in circular MIL area

A = Ultimate drain in amps

LF = Conductor loop feet

K = 11.1 constant factor for commercial (TW type) copper wire

AVD = Allowable voltage drop

Check again that the ampacity rating of the cable meets the requirement for the installation application. Consult local electrical codes (NEC, CEC, etc.) for guidelines. If required, increase the size of the cable to meet the code.

## 5.6 DC Output

DC cable connections to the system are made within, or just outside, the integrated distribution module located on the right side of the shelf (recall Figures 1 and 3). To ensure proper access to connections, install DC cables in the sequence described in this section.



### WARNING

Leave cables disconnected at battery and verify output polarity using a voltmeter. Make battery connections only after all other wiring is completed.

DC output wire shall be UL approved XHHW or RHH/RHW (for Canadian users, RW90 Type).

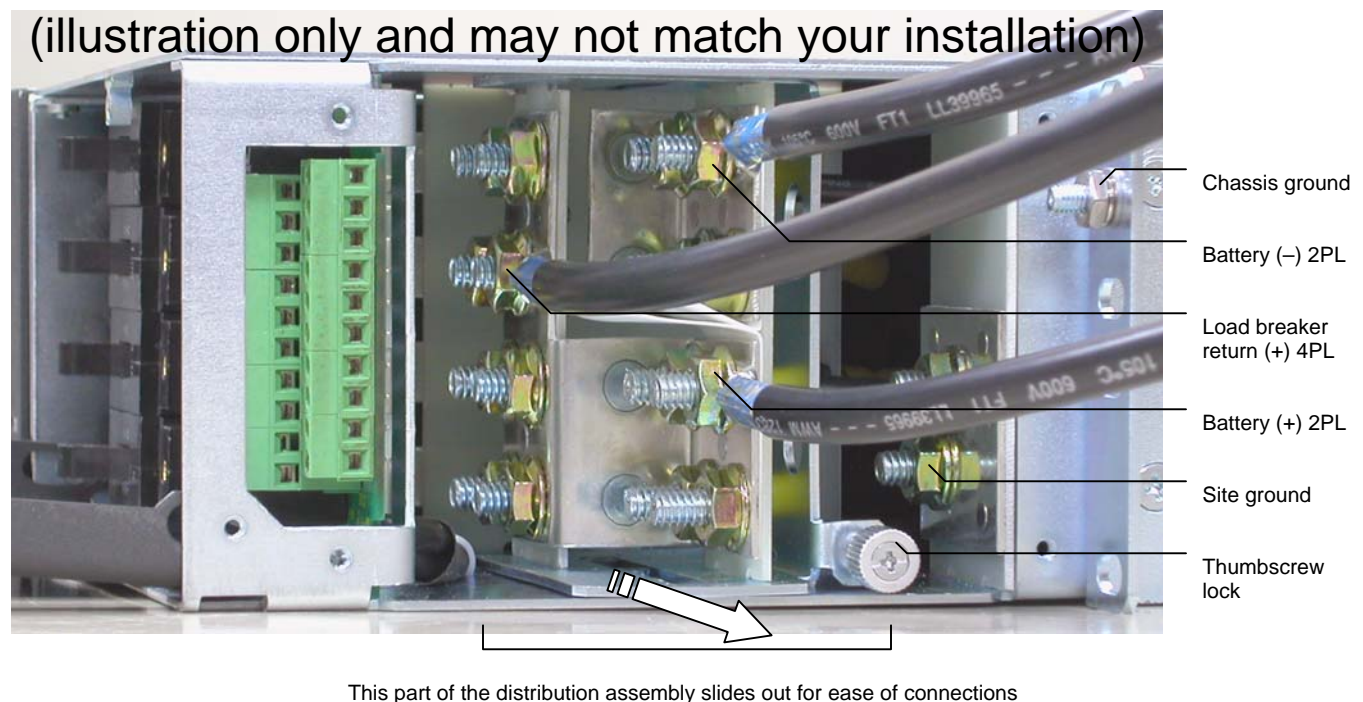


Figure 6—DC output connections

**NOTE:** Cabling must be done with enough slack to allow the distribution assembly to be locked into place.

### 5.6.1 Chassis and Site Ground Connections

#### WARNING

For safety reasons, ensure the system is properly bonded to the building's ground grid.

Both the shelf chassis ground (via power system chassis ground) and common return shall be connected to the site ground to ensure correct operation of the system and to prevent drifting floating analog (especially current) readings.

The chassis ground connection is located on the center mount rack bracket. Connect to the #10-32 stud using single-hole lug and hardware as provided.

The system site ground is located within the distribution module to the left of the chassis ground location (shown in Figure 6 above). The two studs are oriented at a 45-degree angle, which requires a 1/4" on 5/8" center lug.

### 5.6.2 Battery Connections

There are connection points for two strings of batteries. Via the thumbscrew lock, disengage part of the distribution assembly to slide it out the right side of the shelf as far as necessary (Figure 6).

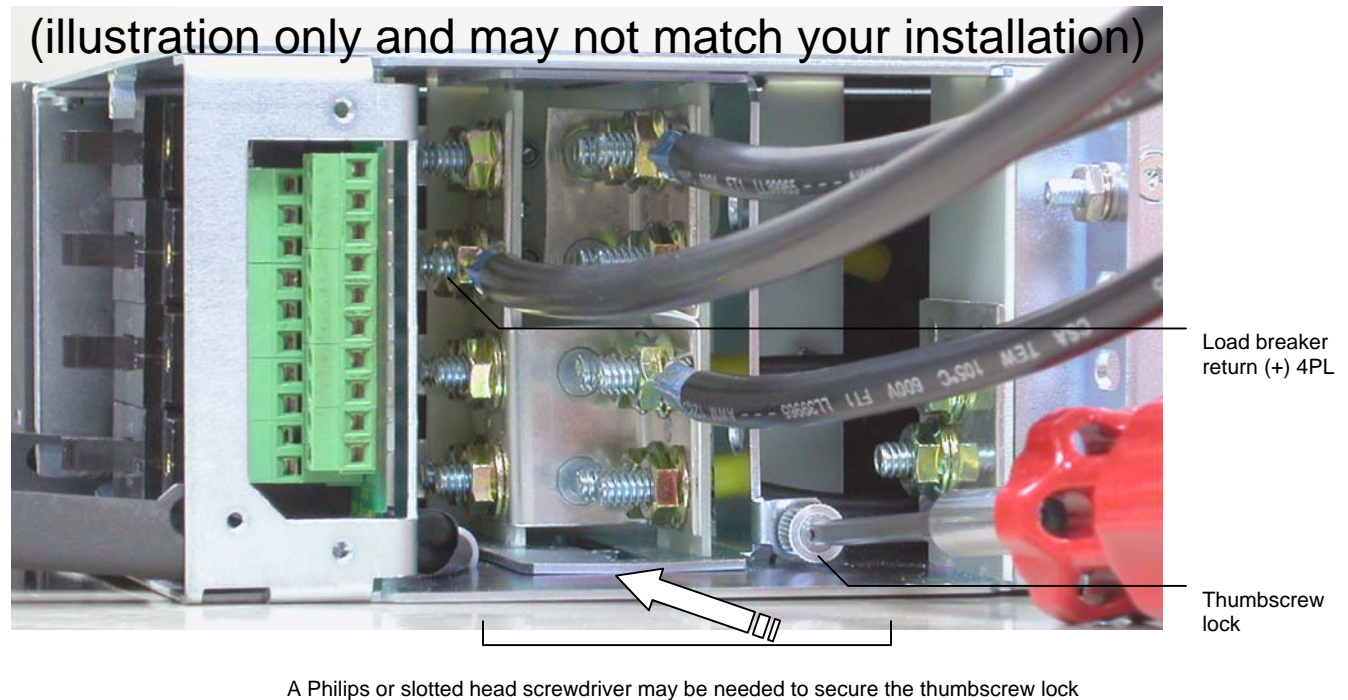
Connect the battery (+) cabling to the bottom set of studs and the battery (-) cabling to the upper set. Lugs required are 1/4" on 5/8" centers. Refer also to Figure 6 with respect to the battery cables and the connection points positioned for proper access.

### 5.6.3 Breaker Ground Connections

The load breaker returns (+) for each of the four breakers are also found on the same part of the (sliding) distribution assembly.

Connect to the breaker (ground) returns using 1/4" on 5/8" center lugs.

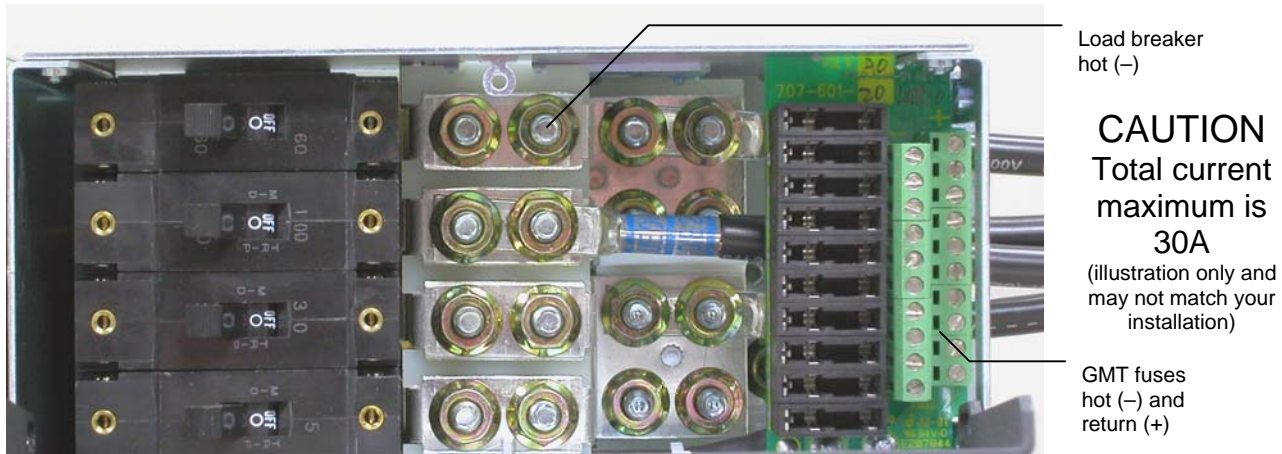
Slide the connection point assembly back into the distribution module and secure with the thumbscrew lock (Figure 7). Note the cable(s) and the connection points positioned for proper access.



**Figure 7—Breaker ground connections**

### 5.6.4 Breaker Hot Connections

Connect to the four load breaker hot (–) termination pairs using 1/4" on 5/8" center lugs (Figure 8).



**Figure 8—Front view of distribution module (cover removed)**

### 5.6.5 GMT Fuse Distribution

The ten (10) GMT-style fuses and the associated control terminal blocks are accessible from the front panel of the distribution module (Figure 8).

Connect via screw terminations, hot (–) and return (+), for each fuse position.

### 5.7 CAN Out Port

A single CAN Out port, for communications with CAN-enabled equipment (nodes), is located on the shelf front.

Daisy-chain from node to node (CAN OUT of one node to CAN IN of another) as necessary and ensure that only the last node is terminated.

**NOTE:** *This system has a limit of twelve Cordex 1.2kW rectifiers; they do not have self-powered CAN Bus nodes.*

### 5.8 Network Connection and Remote Communications via CXCM1

The Cordex system can be set up, monitored and tested via modem or ETHERNET 10/100 Base-T serial data connection. The communication protocol supports a web interface. Some standard scenarios are described below:

#### 5.8.1 Modem Port (Straight Through Cable)

The Modem port is designed for CXCM1 connection to a user supplied modem via a front panel DB-9 connector.

Connect to the CXCM1 from the modem with a straight through cable.

#### 5.8.2 Ethernet Port for Network Connection (Standard Network Cable)

The Ethernet port is designed for CXCM1 connection to a user supplied network (TCP/IP secured by user) via a front panel RJ-45 jack.

Connect to the CXCM1 using a standard network cable. Pinouts are shown in drawing 030-834-08.

#### 5.8.3 Ethernet Port for Local Connection (Crossover Cable)

Local access (e.g. laptop computer) is also possible from the Ethernet port connection using a standard network crossover cable.

## 5.9 Signal Wiring Connections

For terminal block connections, the recommended wire sizes are #16 to #26 AWG (1.5 to 0.129mm<sup>2</sup>) for the temperature range of 0 to 50 deg. C (as per UL/CSA). Control and sense wires shall be UL approved Style 1015 (for Canadian users, TEW type).



**CAUTION:** to reduce risk of fire, use only #26 AWG (0.129mm<sup>2</sup>) or larger wire.

**NOTE:** To aid the user with installation, frequent reference is made to drawings located at the rear of this manual. Custom configurations may be detailed within the Argus power system documentation package.

The signal cables should be bundled together and routed through the entry holes of the shelf.

### 5.9.1 Analog Inputs for CXCM1

**CAUTION:** Ensure the correct polarity is used for all input cable terminations.

The analog input channels are used to monitor various types of electrical signals.

Voltage (Input) is 0—60Vdc. Temp Probe is 0—20Vdc with power source.

#### 5.9.1.1 Voltage

Voltage Input #1 (load voltage per CXC software) terminals on the shelf provide connections to an optional secondary voltage input. For example, this can be terminated to the load side of an LVD contactor to monitor load voltage.

Voltage Input #2 (battery voltage per CXC software) is wired internally to the rectifier output voltage of the shelf. This is used as the reference for system alarming (such as high voltage) and control (such as LVD).

The Battery -48V should be connected at the battery system voltage terminal for CXCM1 reference when a battery disconnect device is used. It is critical to CXCM1 operation as it ensures a source of power to the CXCM1 should the disconnect device open the circuit.

#### 5.9.1.2 Current

Current Input #1 (load current per CXC software) is wired internally to the system current shunt (75A/50mV).

#### 5.9.1.3 Temperature Sensor

Temperature Probe input channels provide connections for up to two temperature sensors. A voltage is supplied to these terminals for sensor measurements.

### 5.9.2 Digital Inputs for CXCM1

The digital input channels (factory-installed) are used to monitor various alarm and control signals. All input channels are voltage activated and accept a bipolar (i.e. negative or positive) DC signal directly.

D1 is wired internally for CB/fuse trip. D2 is available for customer connections as required.

### 5.9.2.1 Connection Method

Typical Argus systems use the “reset with Hot and trigger with Ground” connection. The digital input is wired in such a way that the Hot is wired directly into one of the input terminals; e.g., negative input for -48V systems. The other input terminal is wired to the Ground (common) of the system through a relay (dry contact – usually located on the equipment requiring monitoring). This method (see Figure 9) allows the digital input to receive (or not receive) a Ground signal on an alarm.

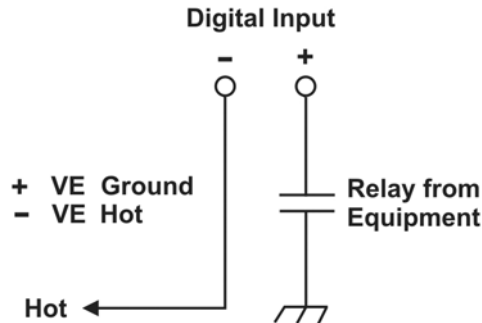


Figure 9—Showing digital input connection method

### 5.9.2.2 Programming the Digital Input

The digital input channels can be programmed for “active high” or “active low.” Active high indicates “alarm on the presence of a ground signal” and active low indicates “alarm on the removal of a ground signal.” See CXC Software manual for detailed instruction on programming.

Voltage Range (Vdc)	Voltage Level (Vdc) Considered As “0” (Off)	Voltage Level (Vdc) Considered As “1” (On)
0—60 (system voltage setting)	0—3	9—60

Table B—Voltage level definitions for digital inputs

### 5.9.3 Alarm (Relay) Outputs

Terminals provide contacts for extending various alarm or control signals. Each relay output can be wired for NO or NC operation during an alarm or control condition. See Figure 10.

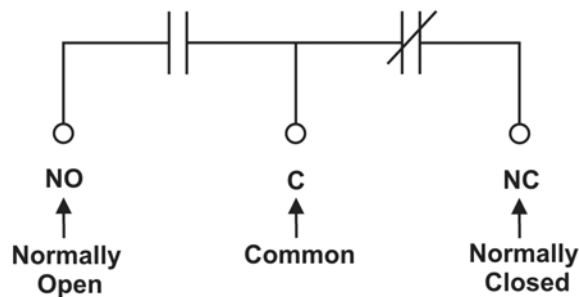


Figure 10—Showing relay connections

Relays can be programmed to energize or de-energize during an alarm condition (see CXC Software manual). When the CXCM1 reset button is pressed or power is lost, all relays de-energize.

These relays could be used for additional external LVD contactor control; however, this would not provide the redundant LVD control as with the assigned output pins described below.

## **5.9.4 LVD Control (Load Disconnect or Battery Disconnect) Option**

The disconnect option is controlled by and connected internally to relay K1.

### **5.9.4.1 LVD Inhibit**

Should it be necessary to remove the CXCM1, the customer connection board (on the front of the shelf) provides shorting pins (JP2) to inhibit (or override) the LVD Control function. See drawing 030-834-08 next to TB11, pin 22, of the customer connections.

If the LVD is controlled on NC contacts (factory default for LVD option), then JP2 pins 1 and 2 must be shorted together to maintain LVD operation. If the LVD is controlled on NO contacts, then pins 2 and 3 must be shorted together. For normal operation, the factory-supplied shorting jumper should be left on pins 3 and 4.

## **5.9.5 LVD Control Alternative**

The LVD Control functions can be hardwired directly from an alarm output relay to an external LVD contactor (or panel). See Controls Menu Defaults in the CXC Software manual.

## 6 Operation

### 6.1 Main Rectifier States

Rectifier operation can be broken up into five main states:

1. Off,
2. Start delay,
3. Soft start,
4. Normal operation,
5. Turning off.

Each state is characterized as being distinct and necessary for the operation of the rectifier. These states are briefly described below.

#### 6.1.1 Off State

The rectifier will be in the Off state immediately after power is applied to the rectifier or after a rectifier shutdown. The shutdown source may be remote or local shutdown, AC shutdown, OVP or thermal shutdown.

When the rectifier is in this state the DC-DC converter is turned off and the CXC will be monitoring its inputs for the proper conditions to begin the start up sequence.

When the conditions have been met for the rectifier to start up, it will transition to the Start Delay state.

#### 6.1.2 Start Delay State

When the rectifier is in the Start Delay state, the DC-DC converter is held off and still not sourcing power and is waiting for a given amount of time before transitioning to the next state.

When in this state, the CXC continues to monitor its inputs.

After the Start Delay state the rectifier will transition to the Soft Start state.

**NOTE:** *Soft start, or current walk-in, gradually increases the voltage and current output of the rectifier upon startup. This is done to reduce the instantaneous load on the AC source.*

#### 6.1.3 Soft Start State

When the Soft Start state is entered, the rectifier will be turned on and the output voltage and output current will be gradually increased. If a load is present, the rectifier will begin to source power.

When the voltage and current limit ramps have finished, the rectifier will transition to the Normal Operation state.

#### 6.1.4 Normal Operation State

The Normal Operation state is the state that the rectifier will be in performing all of the rectifier functions and features specified herein.

From this state, the only valid transition is to the Turning Off state. This transition will happen if the rectifier is required to shut down.

#### 6.1.5 Turning Off State

The Turning Off state is entered because a short delay is required before the rectifier actually turns off to take care of any initialization requirements.

When this short delay has elapsed, a transition to the Off state is made.

## 6.2 Main Rectifier Modes

In addition to Main Rectifier States, there is a set of Main Rectifier Modes. These modes can be divided into two categories as follows:

### 6.2.1 Output Voltage Modes

Voltage modes can be thought of as modes that, under software control, can directly adjust the output voltage. The qualification of 'under software control' is made because there are processes that occur in the rectifier that can change the output voltage that do not adjust the output voltage directly (such as the rectifier being in current limit).

The following table lists the five Output Voltage Modes and a description of when they are active:

Output Voltage Modes	Active when...
Float	Output voltage is set to the float voltage setting.
Equalize	Output voltage is set to the equalize voltage setting.
Battery Test	Output voltage is set to the battery test voltage setting.
Safe	Output voltage is set to the safe mode voltage setting.
Manual Test	Output voltage can be manually adjusted outside of the standard adjustment ranges.

**Table C—Output voltage modes**

### 6.2.2 Output Current/Power Modes

These modes directly affect the output current and power.

The following table lists the four Output Current/Power Modes and a description of when they are active:

Output Current/Power Mode	Active when...
Temperature foldback mode	Output current and power limit have been reduced due to high temperature of the heatsink or internal ambient temperature sensor.
AC foldback mode	Output current and power limit have been reduced due to low AC input voltage. <i>Note: this will reduce the risk of tripping an AC breaker due to increased AC current draw as the AC voltage decreases.</i>
Short circuit foldback mode	Output current limit has been reduced due to a short circuit at the output.
Internal fault foldback mode	Output current limit has been reduced due to an internal fault.

**Table D—Output current/power modes**

## 6.3 Can Bus Communications

The CAN bus is used for communication between the rectifier and CXC.

The communication between the rectifier and CXC consists of commands and data transfer that are used during the operation of the power system to configure the rectifier with system settings and to monitor rectifier status.

## 6.4 Factory Ranges and Defaults

The following table lists the rectifier settings/ranges/defaults; changes are made via the CXC:

Setting	Range (minimum to maximum)	Default
Float (FL) Voltage	48 – 58V	54V
Equalize (EQ) Voltage	50 – 58V	55V
Battery Test (BT) Voltage	44 – 52V	46V
OVP	See note below – 59V	57V
Current Limit (CL)	23 – 100%	100%
Power Limit (PL)	0 – 100%	100%
Module Start Delay	0 – 250s	1s
System Start Delay	0 – 600s	0s
Low Voltage Alarm (LVA)	42 – 52V	44V
High Voltage Alarm (HVA)	52 – 59V	55.5V
EQ Timeout	1 – 2399h	30h
BT Timeout	1 – 250h	8h
Softstart Ramp-rate	Normal/Fast	Normal
CL/PL Alarm	Enable/Disable	Enable
Remote Shutdown	Enable/Disable	Enable
Ramp Test	Enable/Disable	Enable

**Table E–Cordex 48-1.2kW factory ranges and defaults**

**NOTE:** OVP cannot be set below the present system/FL/EQ/BT voltage setting or the safe mode voltage of 51.4V.

## 7 System Startup

After completing the shelf wiring and installation, perform the following startup and test procedure to ensure proper operation:

### 7.1 Check System Connections

- Ensure AC is off, battery is disconnected, and all power modules are removed from the shelf.
- Triple-check the polarity of all connections.

### 7.2 Verify AC and Power the Shelf

- Install one power module.
- Verify AC input voltage is correct and turn on the corresponding AC input feeder breaker.
- The power module OK LED should illuminate after a preset start delay.
- Using the CXCM1, test functionality of various module alarms and controls.

### 7.3 Check Battery Polarity and Connect

- Verify correct battery polarity using a voltmeter (ensuring no cells or batteries are reversed).
- Connect battery as required to the output of the system or turn on battery breaker.
- Install remaining power modules.
- In the adjustments menu of the CXCM1 (web browser), set Float and Equalize voltage to the levels specified by the battery manufacturer.
- Using the CXCM1, test functionality of various module alarms and controls. In addition, perform a load test with the system using a resistive load box as needed.

#### 7.3.1 CXCM1 Alarm Configuration for Nominal 120Vac Operation

The default setting for low AC voltage alarming is 180Vac. For nominal 120Vac operation, it is recommended to reset this value to 100Vac.

To reconfigure this alarm parameter, go to “Alarms” – “Configure Alarms”. Under “Alarm Configuration,” select “Voltage Alarms.” Select and modify the activation value for “AC Mains Low” to 100Vac. Submit changes to save the new configuration.

### 7.4 CXC Reset

#### 7.4.1 Soft Reset

The reset button located on the front panel of the CXCM1 is for restarting the microprocessor. When pressed momentarily, the unit beeps twice then resets. The front-panel LED's will illuminate temporarily, but will extinguish after the system has finished its 15-second self-test.

#### 7.4.2 IP Address Reset

To reset the IP address, press and hold the front panel reset button for three seconds. The CXCM1 unit will beep three times, IP will be reset (to 10.10.10.201) and DHCP will be disabled. The settings will be saved and the unit will then reset.

This will allow local access; e.g., with a laptop and a standard network crossover cable. See current version software manual for details.

#### 7.4.3 Hard Reset

A hard reset of the CXCM1 may be performed by unplugging the module. This may be used to restart the microprocessor in the event that the front panel (soft) reset button fails to operate as described above.

**CAUTION: Use of hard reset may cause loss of data.**

## 8 Maintenance

Although very little maintenance is required with Argus systems, routine checks and adjustments are recommended to ensure optimum system performance. Qualified service personnel should do repairs.

The following table lists a few maintenance procedures for this system. These procedures should be performed at least once a year.



### **WARNING: HIGH VOLTAGE AND SHOCK HAZARD.**

**Use extreme care when working inside the shelf while the system is energized. Do not make contact with live components or parts.**

**Circuit cards, including RAM chips, can be damaged by static electricity. Always wear a grounded wrist strap when handling or installing circuit cards.**

Procedure	Date Completed
Clean ventilation openings	
Inspect all system connections (re-torque as necessary)	
Verify alarm/control settings	
Verify alarm relay operation	

**Table F–Sample maintenance log**

### 8.1 Fan Replacement

1. Shut off the unit and unlock the power module.
2. Slide the module 10 cm (4") out of the shelf and wait two minutes for module capacitors to discharge.
3. Remove the bottom screw that secures the front panel to the module chassis.
4. Slide the front panel out.
5. Disconnect the fan power lead wires from the module.
6. Note the direction of airflow and remove the fan from the front panel.
7. Install the replacement fan following the preceding steps in reverse order.

## 9 Argus Conventions

### 9.1 Numbering System

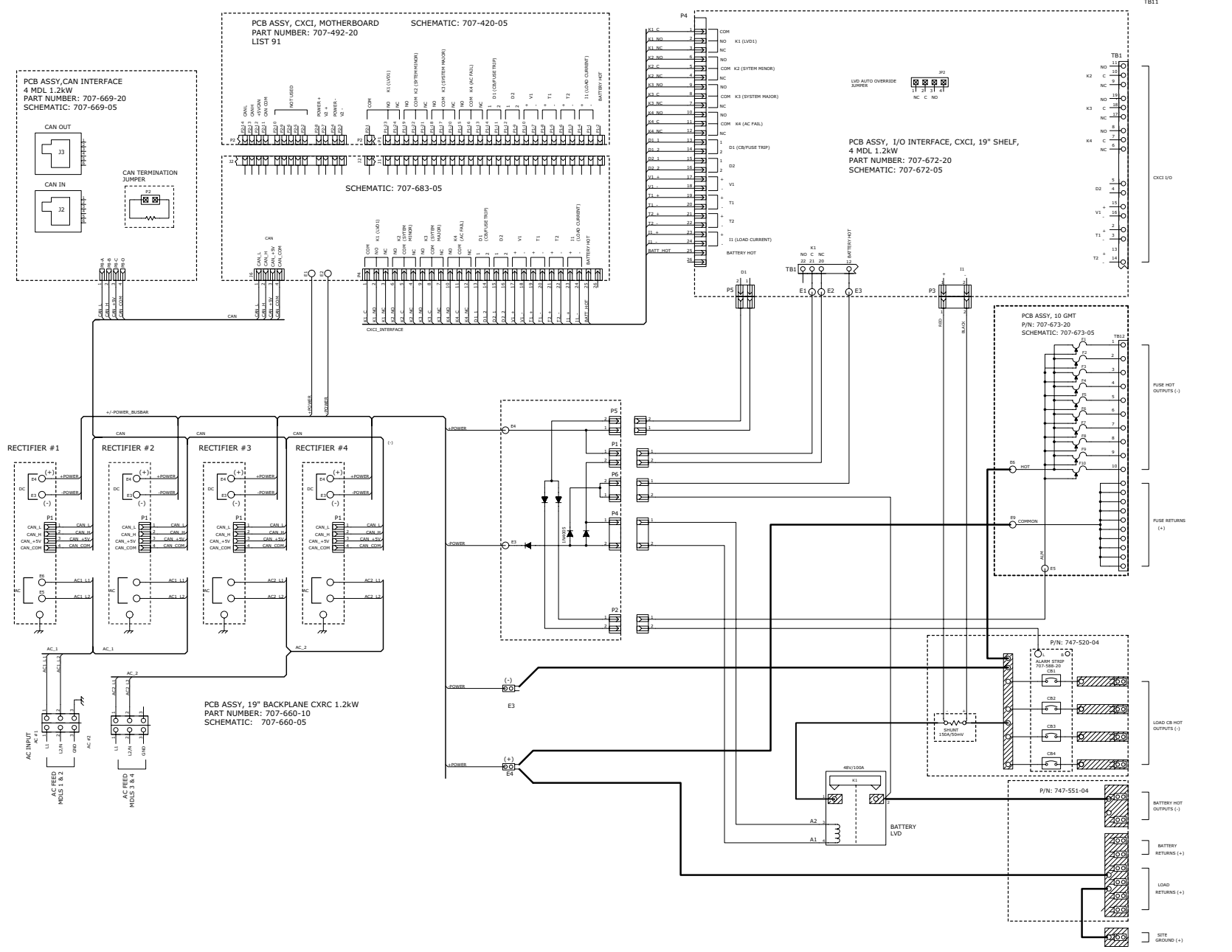
Argus Technologies uses an eight-digit drawing number system, which is broken into three blocks. The first three digits describe the category of the product; e.g., rectifier or fuse panel. The next three digits indicate the sequence in which the product number was allocated in a particular category. The last two digits indicate the type of drawing, for example:

- “-06” Outline Drawing
- “-08” Customer Connections
- “-20” Main Assembly

Argus uses an eight-digit part numbering system for all components and sub assemblies. Each part is covered by its own unique number. Due to the quantity, categories will not be listed within this manual.

### 9.2 Acronyms and Definitions

AC	Alternating current
ANSI	American National Standards Institute
AWG	American wire gauge
BTU	British thermal unit
CAN	Controller area network
CEC	Canadian Electrical Code
CSA	Canadian Standards Association
CX	Cordex™ series; e.g., CXC for <u>C</u> ordex <u>S</u> ystem <u>C</u> ontroller
DC	Direct current
DHCP	Dynamic host configuration protocol
EIA	Electronic Industries Alliance
EMC	Electromagnetic compatibility
EMI	Electromagnetic interference
ERM	<u>E</u> lectromagnetic compatibility and <u>r</u> adio spectrum <u>m</u> atters
ESD	<u>E</u> lectrostatic <u>d</u> ischarge
FCC	Federal Communications Commission (for the USA)
HVSD	<u>H</u> igh <u>v</u> oltage <u>s</u> hutdown
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
LED	Light emitting diode
LVD	Low voltage disconnect
MTBF	Mean time between failures
NC	Normally closed
NEC	National Electrical Code (for the USA)
NO	Normally open
OSHA	Occupational Safety & Health Administration
OVP	Over voltage protection
RAM	Random access memory
RU	Rack unit (1.75")
TCP/IP	Transmission control protocol / internet protocol
THD	Total harmonic distortion
UL	Underwriters Laboratories



REVISION				
LTR	DESCRIPTION	REV BY	DATE	APPROV
B	PILOT RELEASE	JLM	09/06	

© 2009 ARGUS TECHNOLOGIES

# ARGUS®

THESE DESIGNS AND SPECIFICATIONS ARE CONFIDENTIAL. REMAIN THE PROPERTY OF ARGUS TECHNOLOGIES LTD., AND SHALL NOT BE COPIED OR USED WITHOUT ITS WRITTEN CONSENT

DESIGN	W.H	2009/02	MATERIAL
DRAWN	W.H	2009/02	
CHECKED	TB	2009/02	
APPROVED	MC	2009/02	FINISH

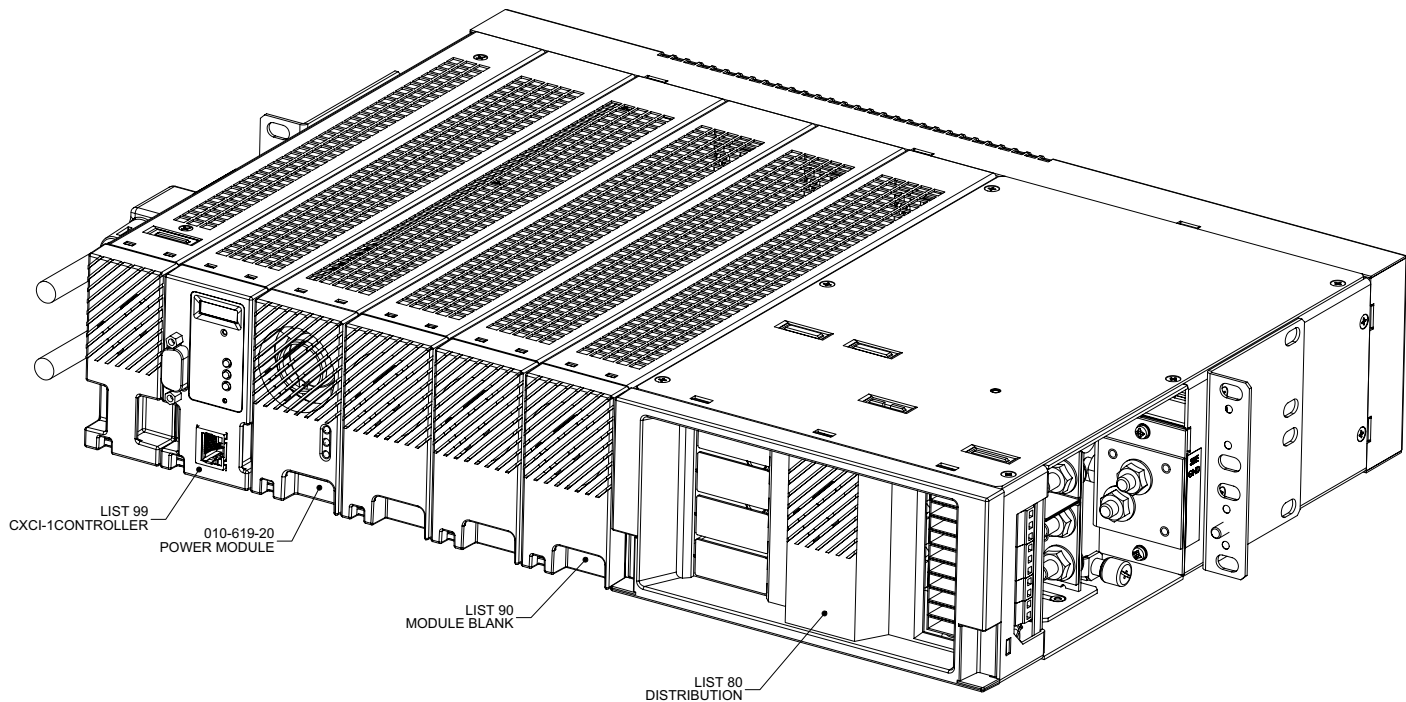
TOLERANCES SCALE N/A

TITLE SCHEMATIC, SHELF, 19", FR ACS, 4 MDL, CXCI, DISTRN, 1.2kW

ISSUE DATE SHEET 1 of 1

SIZE B	S3	DWG NO.	030-834-05	REV	P/B
--------	----	---------	------------	-----	-----

REVISIONS					
LTR	DESCRIPTION	DWN	DATE	CHKD	APPD



LIST 99  
CXCI-1CONTROLLER

010-619-20  
POWER MODULE

LIST 90  
MODULE BLANK

LIST 80  
DISTRIBUTION

ITEM  
QTY

**ARGUS®**

THESE DESIGNS AND SPECIFICATIONS ARE CONFIDENTIAL. REMAIN THE PROPERTY OF ARGUS TECHNOLOGIES LTD. AND SHALL NOT BE COPIED OR USED WITHOUT ITS WRITTEN CONSENT.

UNITS: mm (in)  
 X (X.X) ±1 [±0.040]  
 XX (XX.X) ±0.5 [±0.020]  
 XXX (X.XXX) ±0.05 [±0.002]  
 ANGULAR: ±0.5°

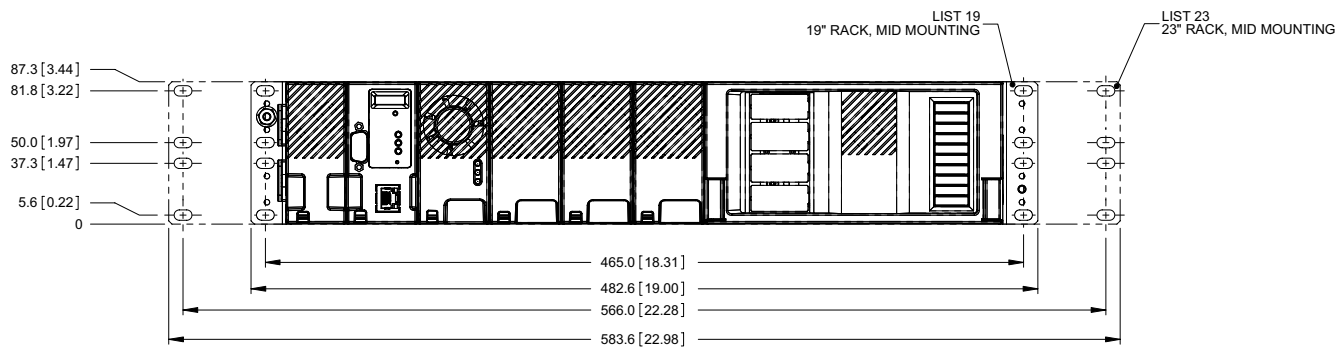
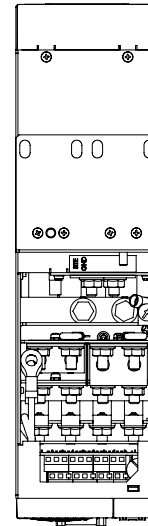
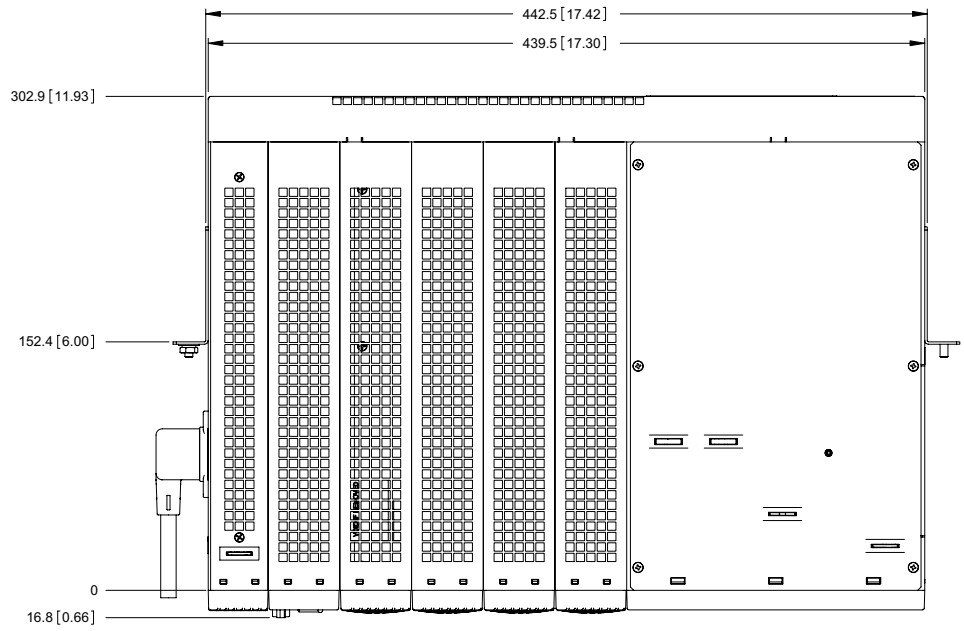


SCALE: NTS

TITLE: **OUTLINE DRAWING,  
 ASSY,SHELF, 19",FR ACS,  
 4 MDL,CXRF48-1.2kW**

	NAME	DATE
DESIGN	SY/MH	2009/05
DRAWN	SY	2009/05
CHECKED	GIA	2009/06
APPROVED	MC	2009/06

ISSUE DATE	SHEET	REV
	1 OF 2	
SIZE [TYPE] DWG NO.	030-834-06 P/C	
	© 2008 ARGUS TECHNOLOGIES	



**ARGUS<sup>®</sup>**

THESE DESIGNS AND SPECIFICATIONS ARE CONFIDENTIAL. REMAIN THE PROPERTY OF ARGUS TECHNOLOGIES LTD. AND SHALL NOT BE COPIED OR USED WITHOUT ITS WRITTEN CONSENT.

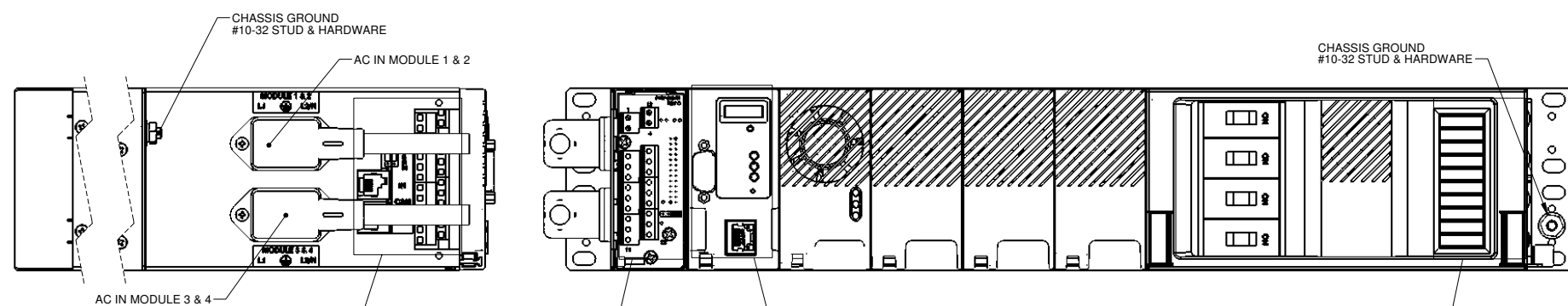
UNITS: mm [in]	±1 [±0.040]	
X [X.XX]	±0.5 [±0.020]	
X.X [X.XXX]	±0.05 [±0.002]	
ANGULAR:	±0.5°	SCALE: NTS

TITLE: **OUTLINE DRAWING,  
ASSY,SHELF, 19",FR ACS,  
4 MDL,CXRF48-1.2kW**

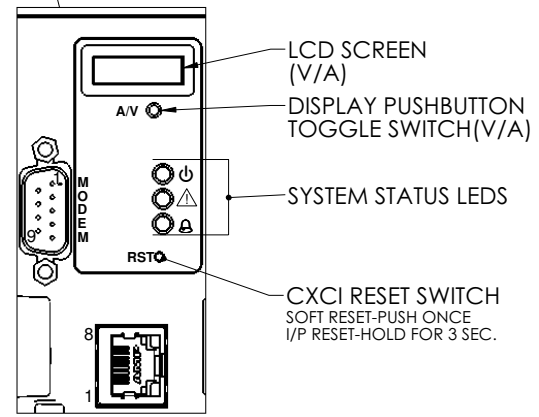
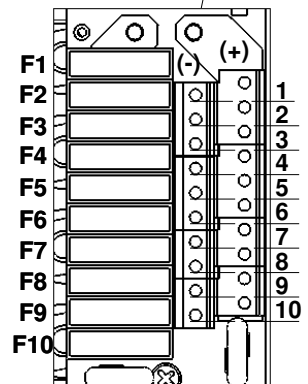
ISSUE	DATE	SHEET 2 OF 2
SIZE	TYPE DWG NO.	REV
B	D2   030-834-06	P/C

© 2008 ARGUS TECHNOLOGIES

REVISIONS				
LTR	DESCRIPTION	DWN	DATE	CHKD/APPD

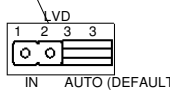
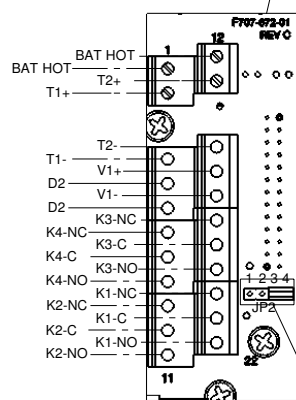


GMT DISTRIBUTION PANEL (30A MAX)



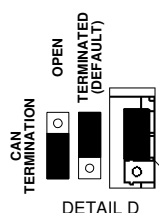
DB9 (FOR ARGUS DC MODEM USE ONLY)

PIN	FUNCTION
1	DCD
2	RX
3	TX
4	DTR
5	COM
6	DSR
7	RTS
8	CTS
9	RI



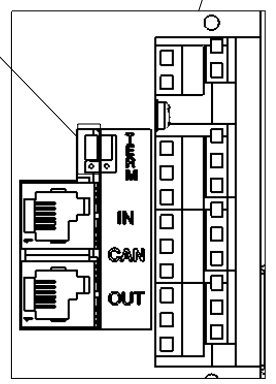
ETHERNET RJ45

PIN	FUNCTION
1	TX+
2	TX-
3	RX+
4	NOT CONNECTED
5	NOT CONNECTED
6	RX-
7	NOT CONNECTED
8	NOT CONNECTED



CAN IN/OUT RJ12 OFFSET

PIN	FUNCTION
1	CAN COM
2	CAN H
3	NOT CONNECTED
4	CAN L
5	NOT CONNECTED
6	CAN +5V



ITEM QTY

**ARGUS**

THESE DESIGNS AND SPECIFICATIONS ARE CONFIDENTIAL. REMAIN THE PROPERTY OF ARGUS TECHNOLOGIES LTD. AND SHALL NOT BE COPIED OR USED WITHOUT ITS WRITTEN CONSENT.

UNITS: mm [in]  
 X [X.X] ±1 [±0.040]  
 XX [X.XX] ±0.5 [±0.020]  
 XXX [X.XXX] ±0.05 [±0.002]  
 ANGULAR: ±0.5°

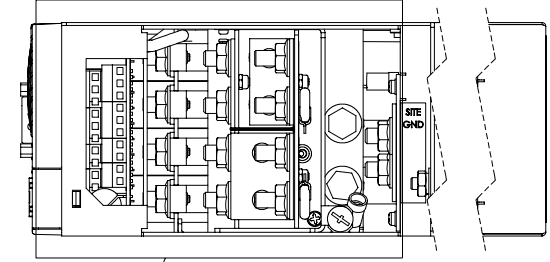
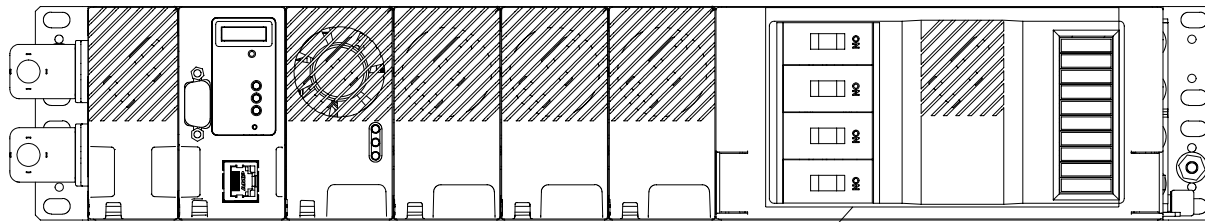
SCALE: NTS

TITLE: CUSTOMER CONNECTION  
 19" FR ACS 4 MDL,  
 CXRF48-1.2kW

DESIGN	NAME	DATE	ISSUE	SHEET
				1 OF 2
DRAWN	WH	2009/07	DATE	
CHECKED			SIZE	
APPROVED			B D2	

030-834-08 P/C

© 2009 ARGUS TECHNOLOGIES



LOAD CB OUTPUTS (-)  
4 x 1/4" - 20 HARDWARE  
ON 5/8" CENTRES

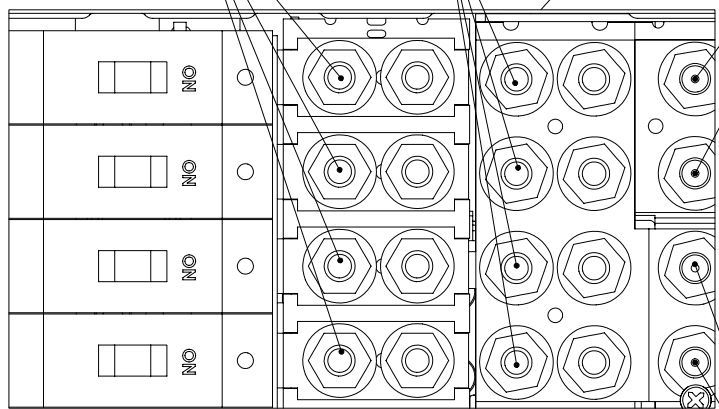
LOAD CB RETURNS (+)  
4 x 1/4" - 20 HARDWARE  
ON 5/8" CENTRES  
(REF)

BATTERY OUTPUTS (-)  
2 x 1/4" - 20 HARDWARE  
ON 5/8" CENTRES

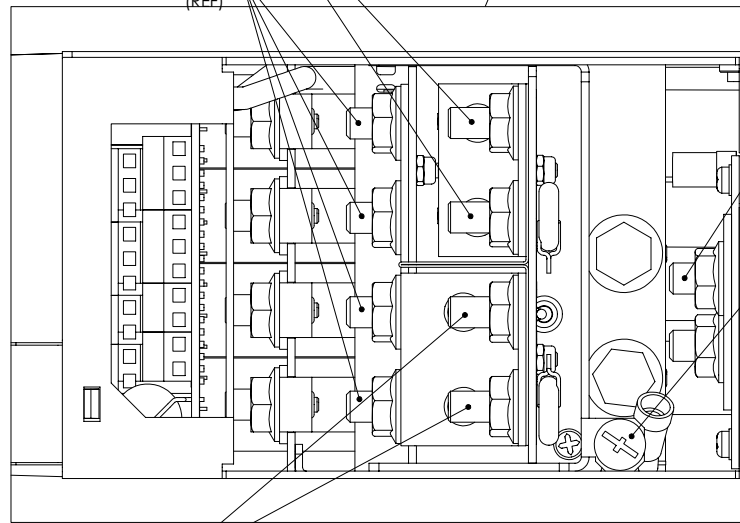
LOAD CB OUTPUTS (-)  
4 x 1/4" - 20 HARDWARE  
ON 5/8" CENTRES  
(REF)

SITE GROUND (+)  
1 x 1/4" - 20 HARDWARE  
ON 5/8" CENTRES  
(REF)

LOOSEN THUMBSCREW AND  
SLIDE OVER TO ACCESS  
LOAD CB RETURNS.



DISTRIBUTION FRONT VIEW  
FRONT PANEL HIDDEN AND GMT FUSE HIDDEN




BATTERY RETURNS (+)  
2 x 1/4" - 20 HARDWARE  
ON 5/8" CENTRES

DISTRIBUTION SIDE VIEW

**ARGUS®**

THESE DESIGNS AND SPECIFICATIONS ARE CONFIDENTIAL. REMAIN THE PROPERTY OF ARGUS TECHNOLOGIES LTD. AND SHALL NOT BE COPIED OR USED WITHOUT ITS WRITTEN CONSENT.

UNITS: mm (in)			
X (X.X)	±1	[+0.040]	 SCALE: NTS
XX (X.XX)	±0.5	[±0.020]	
XXX (X.XXX)	±0.05	[±0.002]	
ANGULAR:	±0.5°		

TITLE: CUSTOMER CONNECTION  
19", FR ACS 4 MDL,  
CXRF48-1.2kW

ISSUE		SHEET	2 OF 2
DATE			
SIZE	TYPE	DWG NO.	REV
B	D2	030-834-08	P/C

© 2009 ARGUS TECHNOLOGIES

This page intentionally left blank.

# WARRANTY AND SERVICE INFORMATION

## Technical Support

Technical support staff are available for answering general questions related to installation, operation and maintenance of Argus products. In Canada and the USA, call Argus toll free at +1-888-GO-ARGUS (+1-888-462-7487) 7:30 am to 5:00 pm Pacific Standard Time.

For emergencies, call +1-888-GO-ARGUS (+1-888-462-7487) 24 hours a day, seven days a week. Customers outside Canada and the USA, call +1-604-436-5547 for technical support.

## Factory Repair and Servicing

All service, beyond initial adjustments, should be carried out by qualified factory service personnel. For these procedures, please contact Argus Technologies at the locations listed in the Service Centers document.

## Warranty Policy

Argus Technologies Ltd. warrants all equipment manufactured by it to be free from defects in parts and labor, excluding third party OEM materials (example: air conditioners, batteries), for a period of two years from the date of shipment from the factory. For third party products the OEM's warranty shall apply. The liability of Argus applies solely to repairing, replacing or issuing credit (at Argus' sole discretion) for any equipment manufactured by it and returned by the customer during the warranty period. The terms of the warranty are Ex Works (EXW) from Argus' factory service location.

Argus reserves the right to void the warranty if:

- (1) identification marks or serial numbers are removed or altered in any way,
- (2) invoice is unpaid, or
- (3) defect is the result of misuse, neglect, improper installation, environmental conditions, non-authorized repair, alteration or accident.

Argus shall not be liable to the customer or other parties for any loss of profits, loss of use, costs for removal or installation of defective equipment, damages or consequential damages based upon equipment failure during or after the warranty period. There shall be no other obligations either expressed or implied. Argus will not honor warranties for batteries and other third party products without prior written Argus authorization.

Customer is responsible for all shipping and handling charges (COD and freight collect will not be accepted without prior approval from Argus Technologies).

Payment terms (North America) are net 30 days subject to prior credit approval. All other orders require payment before shipping.

Payment terms (International) are subject to prior approval and are typically through Tele-Transfer.

## Return Material Policy

Our return policy is designed to ensure prompt, efficient and high quality factory service. A service request order (SRO) number must be obtained before products can be accepted for servicing by the Argus factory. For returns to an authorized service center (refer to the Service Centers document), please consult the individual service center for specific return policies and instructions.

To obtain an SRO number for a factory return, customers must call the appropriate location with the product serial and model number, as well as a brief description of the problem, shipment instructions and billing details.

The original packing container should be used whenever possible. The box should be completely enclosed and constructed of wood or double-wall, corrugated cardboard. At least 3" of foam or shock absorbing packing material must surround the unit. Both the shipping documents and the outside of the box must have the SRO # clearly marked and the product shipped prepaid to the Argus factory service center. Argus will endeavor to repair products within five working days of receipt. Repairs to the returned product are warranted for a period of six months. A service charge may be applied if no fault is found in the returned product. Argus will not accept products without an SRO number.

# Service Centers

## Factory Service Centers

### Canada and International

Argus Technologies Ltd.  
ATTN: RMA Returns  
7033 Antrim Avenue  
Burnaby, BC, V5J 4M5 Canada  
Tel: +1 604 436 5900  
Fax: +1 604 436 1233  
Email: returns@argusdcpower.com

### USA

Argus Technologies Inc.  
ATTN: RMA Returns  
3116 Mercer Avenue  
Bellingham, WA, 98225 USA  
Tel: +1-360 756 4904  
Fax: +1-360 647 0498  
Email: returns-usa@argusdcpower.com

### Asia-Pacific

PCM Electronics (Dong Guan) Co., Ltd.  
Hongli Industrial Area, Miaobian,  
Liaobu Town, Dongguan City,  
Guangdong Province, 523400 China  
Tel: +86 755 8895 3310  
Fax: +86 755 8895 3307

## Authorized Service Center

### Argentina

Argus Technologies de Argentina  
Belen 315, Capital Federal, Buenos  
Aires,  
14071 Argentina  
Tel: +54 (11) 4672 4821  
Fax: +54 (11) 4504 4698  
Cell: +54 9 (11) 4993 9996  
Email: lkleiman@argus.ca

### Asia

Argus Technologies Asia Pte Ltd  
Blk 6 Tagore Lane #160  
Singapore 787570  
Tel: +65 6458 8900  
Fax: +65 6458 2122

### Australia

CPS National  
8/376 Newbridge Rd  
Moorebank, NSW, 2170 Australia  
Tel: +61 02 9822 8977  
Fax: +61 02 9822 8077

### Australia/New Zealand

Alpha Power Systems Pty Ltd.  
Unit 3, 30 Heathcote Road  
Moorebank, NSW, 2170 Australia  
Tel: +61 02 9602 8331  
Fax: +61 02 9602 9180

### Century Yuasa

37 - 65 Colbalt Street  
Carole Park QLD 4300  
Australian Sales & Service  
Tel: +61 07 3361 6587  
Fax: +61 07 3361 6705  
New Zealand Sales & Service  
Tel: +64 9 978 6689  
Fax: +64 9 978 6677

### Brazil

Argus Brasil Serviços e Comércio Ltda  
Rua: Constituição,145/147 - Santos  
São Paulo – Brasil 11015-471  
Tel: +55 (13) 3234 2469  
Fax: +55 (13) 3234 2469  
Cell: +55 (13) 7806 1438  
Email: argusbrasil@bignet.com.br

### Canada

Compower Systems Inc.  
118 Tiffield Road  
Toronto, ON, M1V 5N2 Canada  
Tel: +1 416 293 3088  
Fax: +1 416 293 0671

### Europe

Alpha Technologies Europe Ltd.  
Cartel Business Estate  
Edinburgh Way  
Harlow, Essex, CM20 2DU UK  
Tel: +44 1279 422110  
Fax: +44 1279 423355

### Mexico & Central America

Technologies Argus First De Mexico  
SA de CV  
Anatole France No. 17  
Col. Polanco  
Mexico City, 11560 Mexico  
Tel: +52 55 5280 6990  
Fax: +52 55 5280 6585

### Romania

Alphapower SRL  
Str. Paul Constantinescu nr.5  
Timisoara, Romania  
Tel: +40 21 569 1214  
Cell: +40 31 816 1491

### South America

Argus Technologies Argentina  
Santo Tome 2573, Capital Federal  
Buenos Aires, 1416 Argentina  
Tel: +54 11 4504 4698  
Cell: +54 9 11 4993 9996  
E-pager: 541149939996@nextel.net.ar

### Turkey

IPC Enerji Elk San ve TIC AS  
Inonu cad. Kanarya sok. No:20  
Yenisahra - Kadikoy  
Istanbul, Turkey  
Tel: +90 216 317 41 42  
Fax: +90 216 472 90 66